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Figure 1: Conventional SCR Process Arrangement

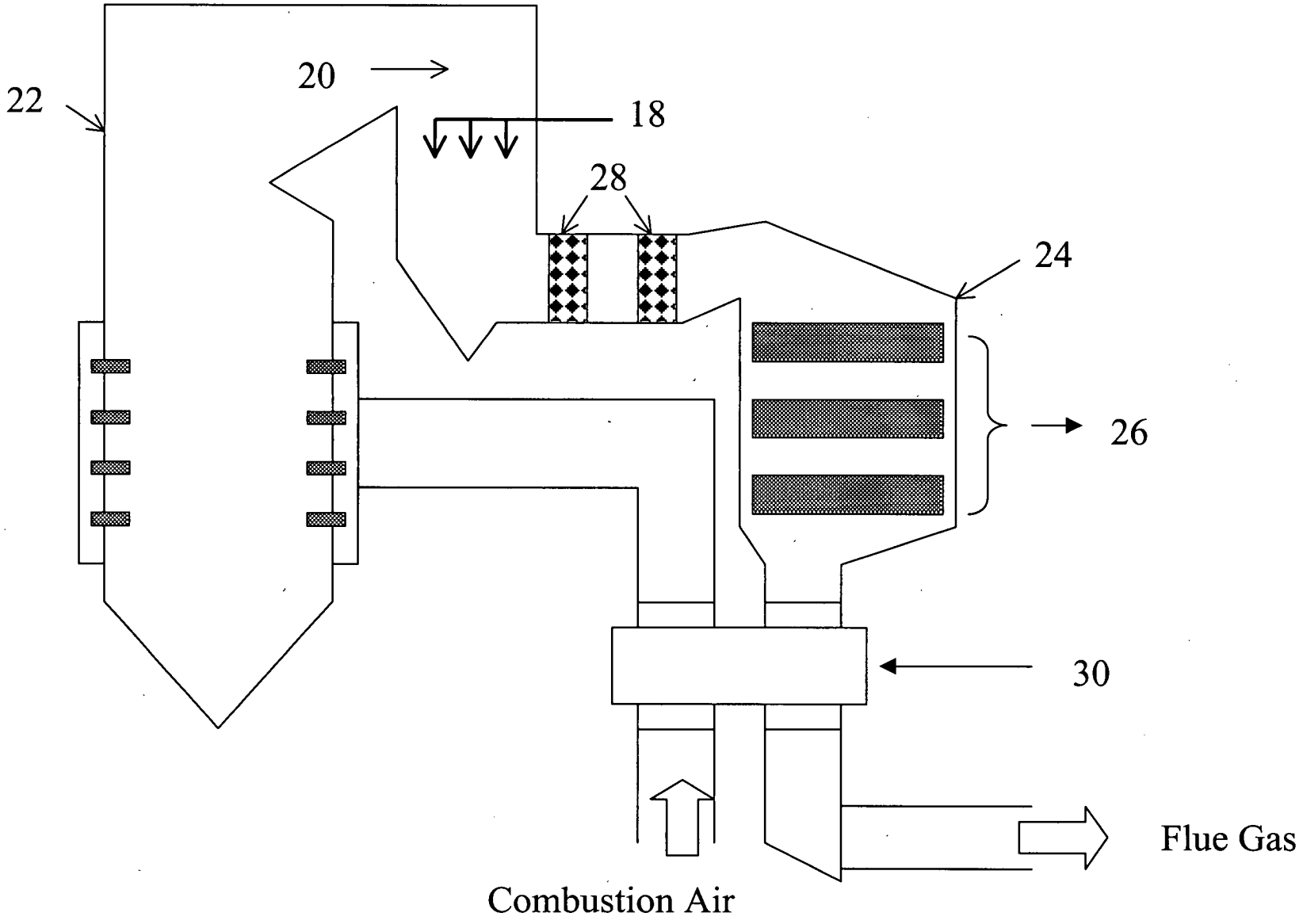
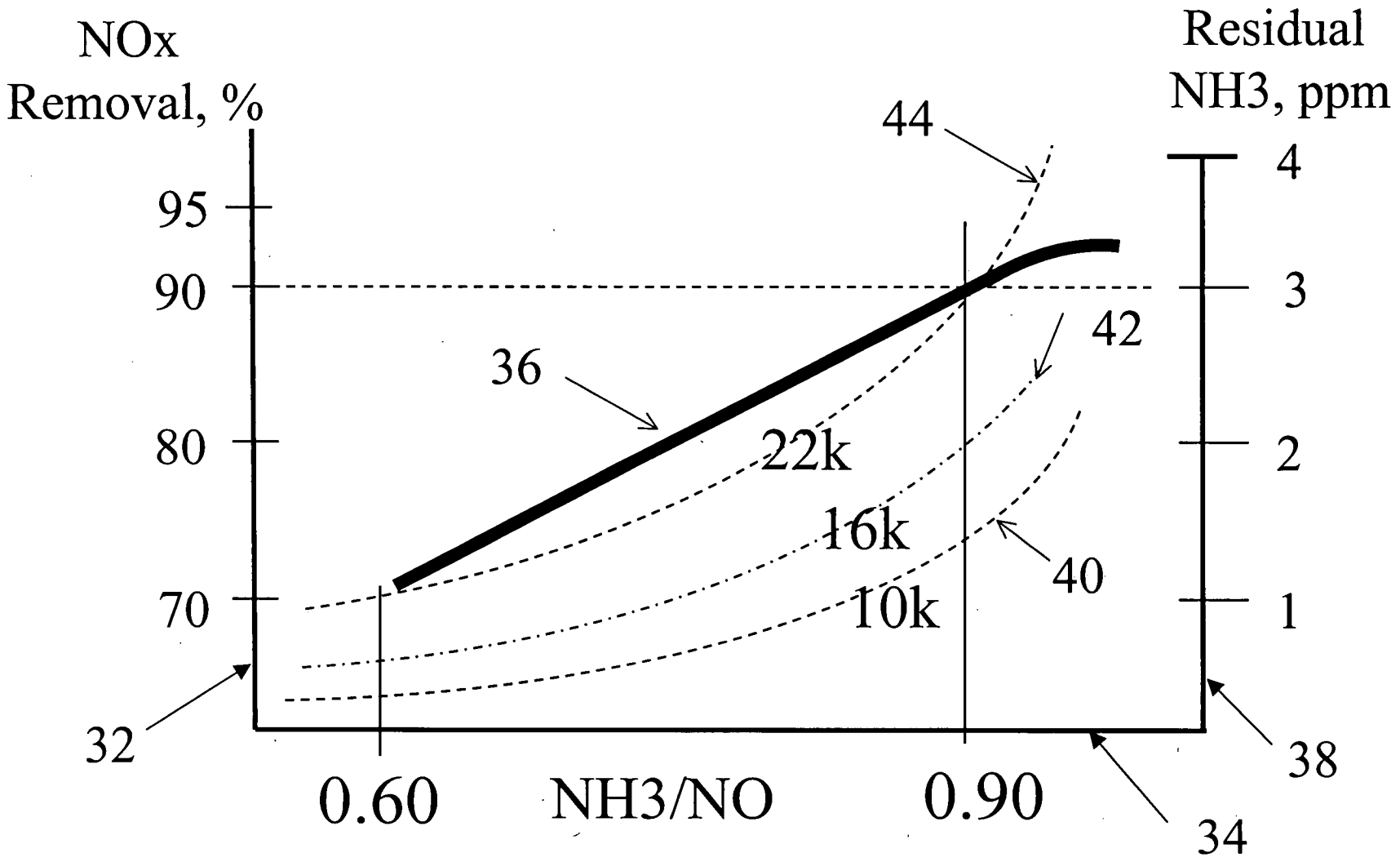


Figure 2: Typical SCR NOx Removal and Residual NH3



Title: MULTI-STAGE HEAT ABSORBING REACTOR AND PROCESS FOR SCR OF NOX AND FOR OXIDATION OF ELEMENTAL MERCURY
Inventor's Name: J. Edward CICHANOWICZ
Application No.: New Patent Application
Docket No.: 023407-00001

Figure 3: NH3/NO Ratio Non-Uniformity Effects on NOx Removal Performance

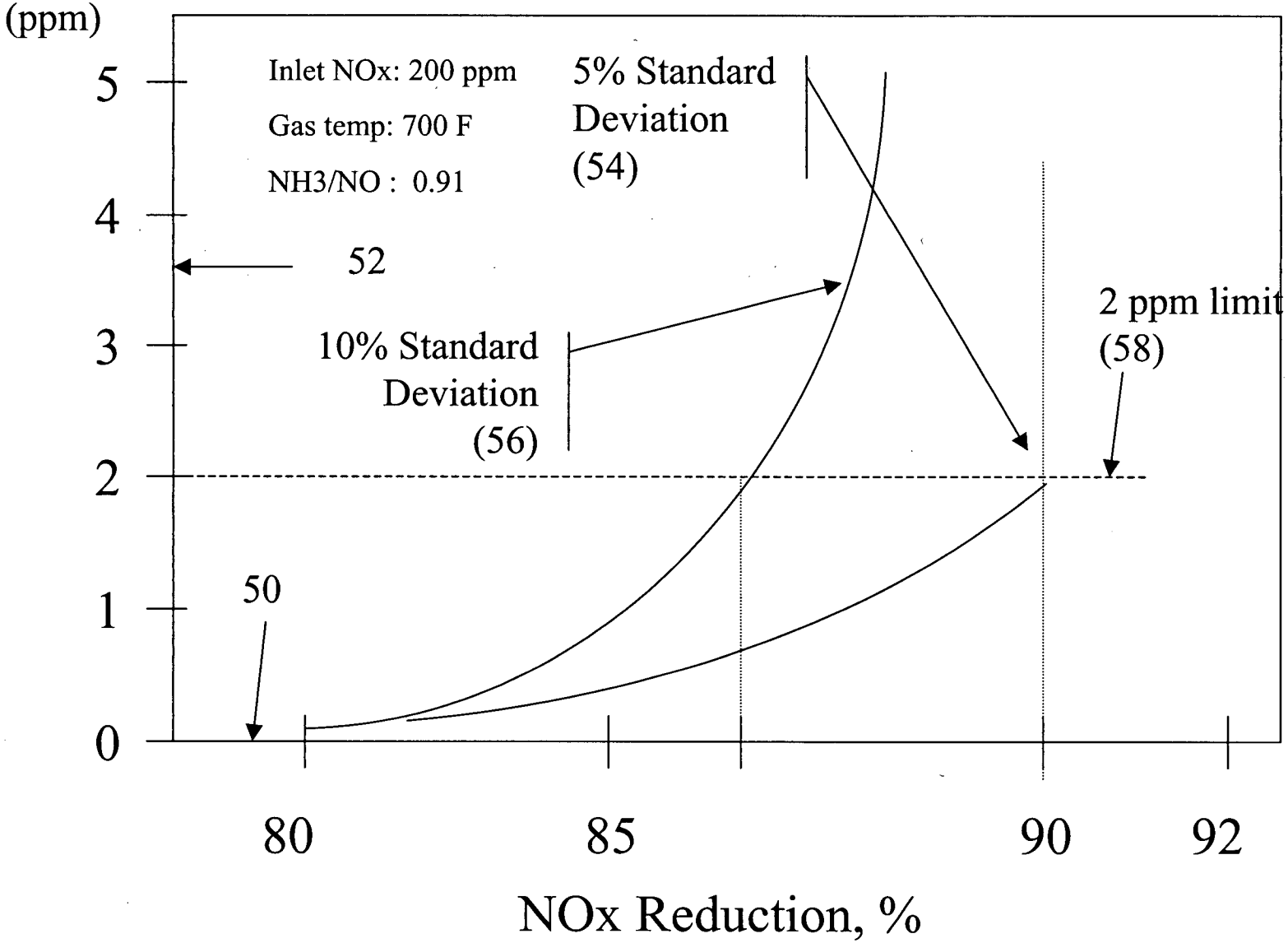


FIGURE 4: SCR PROCESS CONDITIONS ACROSS THE REACTOR AND EACH OF THREE CATALYST LAYERS

	NOx Removal (%)	NOx (ppm)	NH3 (ppm)	Overall NH3/NO Ratio	NH3 Deviation (ppm)	**NH3/NO** Standard Deviation Entering Layer	SO3 Created by SCR (ppm)	ABS Onset Temp, F
Process Inlet		200	182	0.91	9	5%	15	575
Layer 1								
Across	68%	136	136					
Exit		64	46	0.72	9	14%	21	450
Layer 2								
Across	19%	38	38					
Exit		26	8	0.31	9	35%	31	430
Layer 3								
Across	3%	6	6					
Exit		20	2	0.10	9	46%	45	375

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Figure 5: The Influence of Gas Temperature on SO2 Oxidation

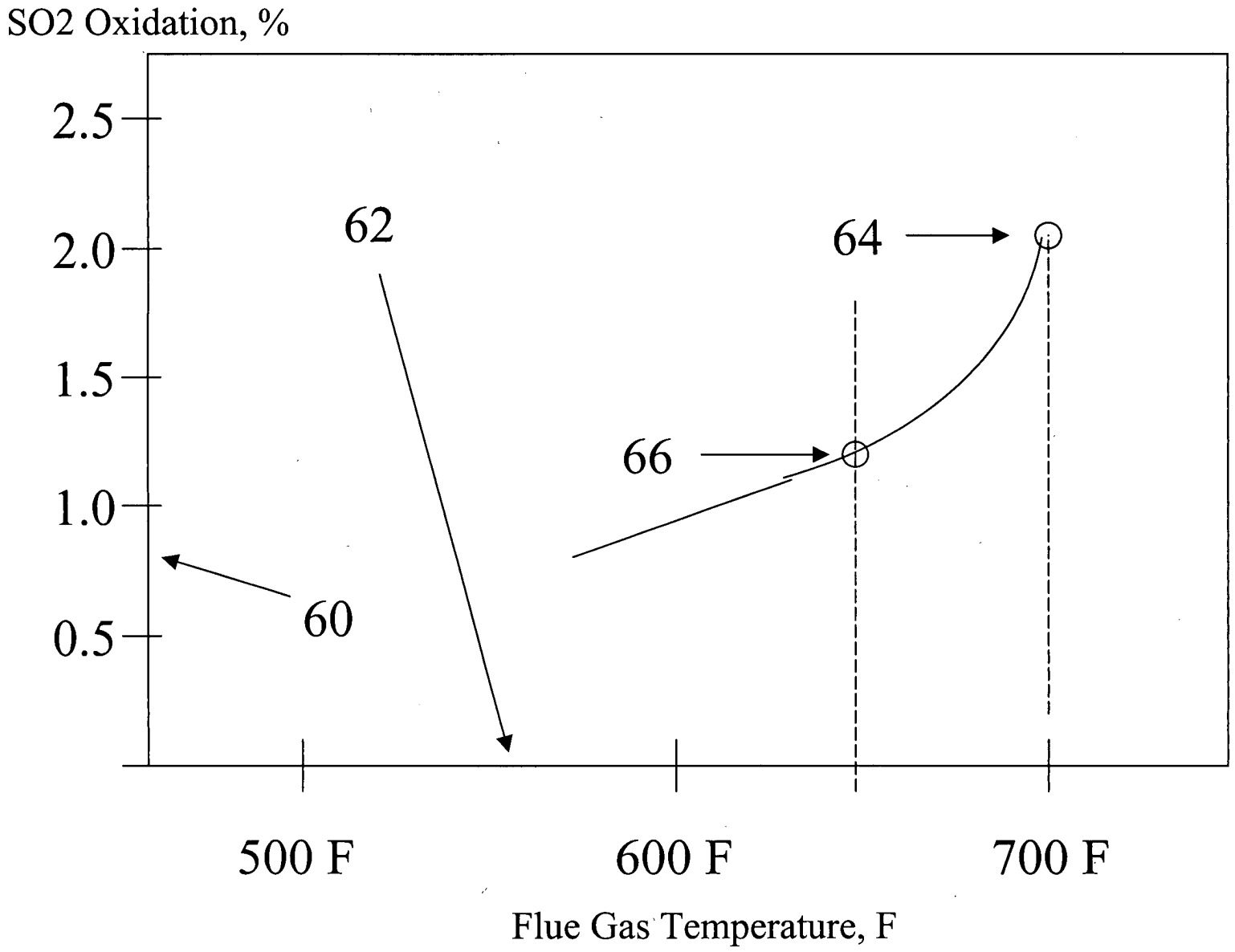

Figure 6: SO2 Oxidation As a Function of NH3/NO Ratio

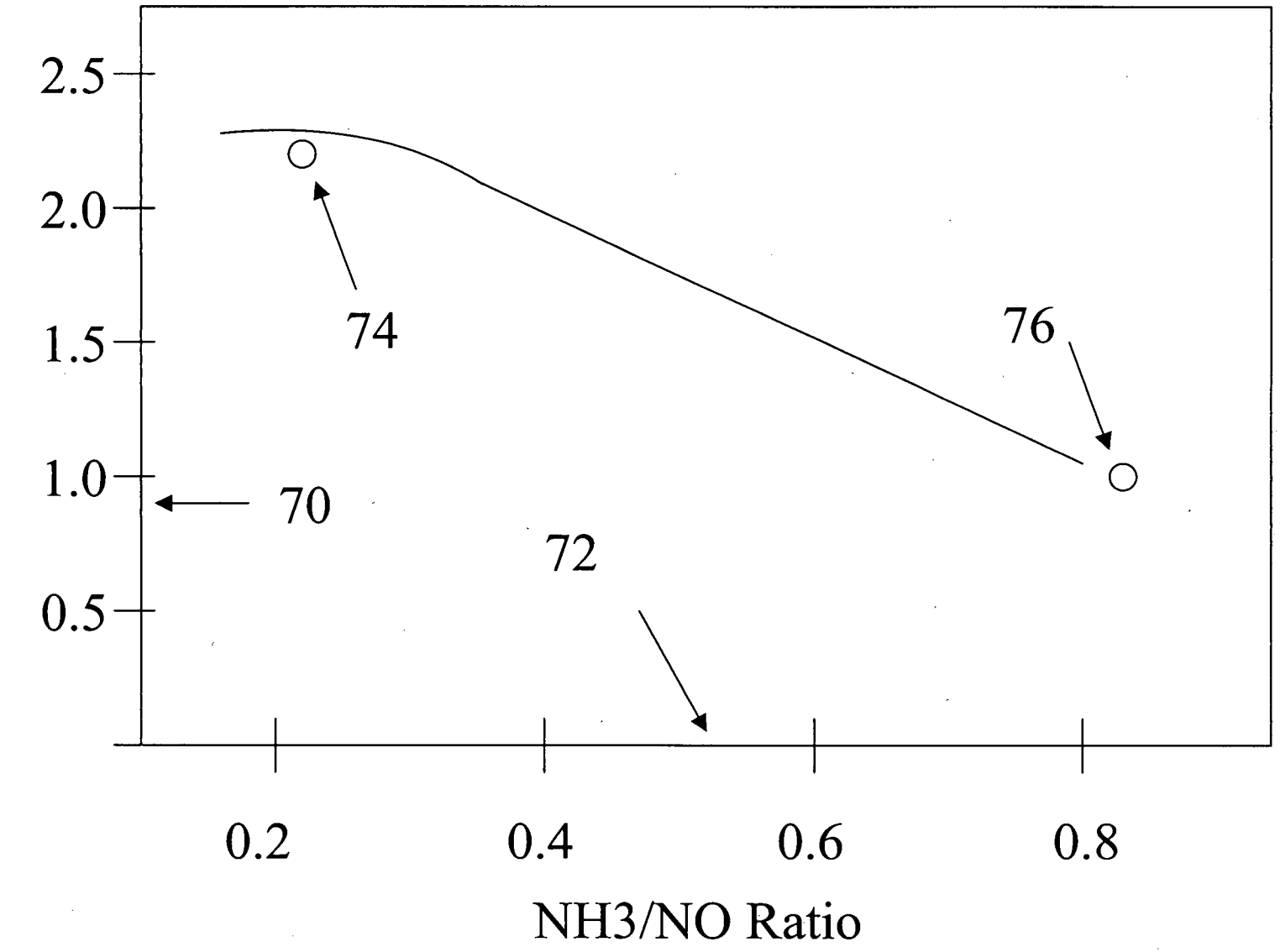

Figure 7: Conventional Ljungstrom-type Air Heater

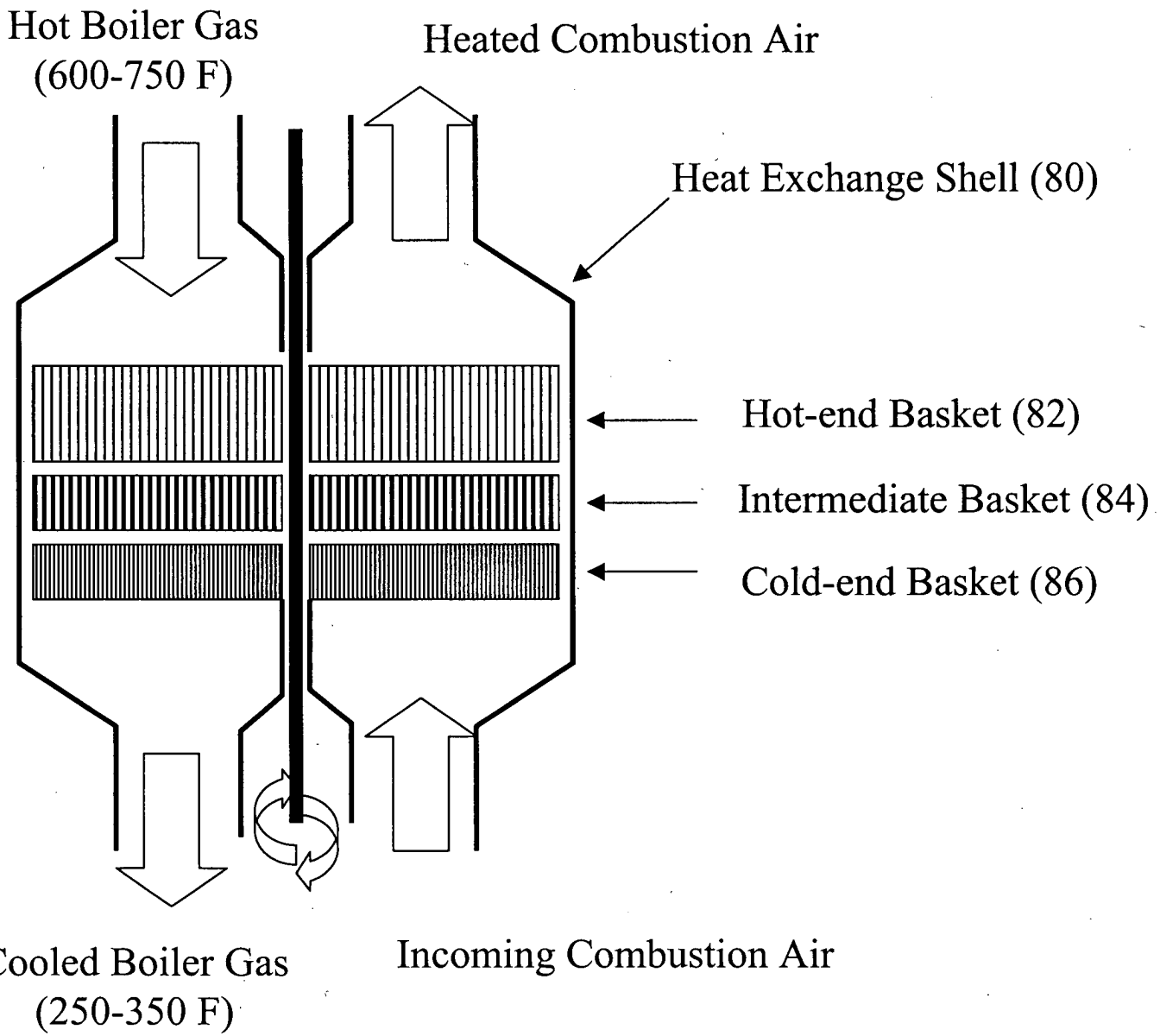

Figure 8: Detail of Heat Exchange Surfaces

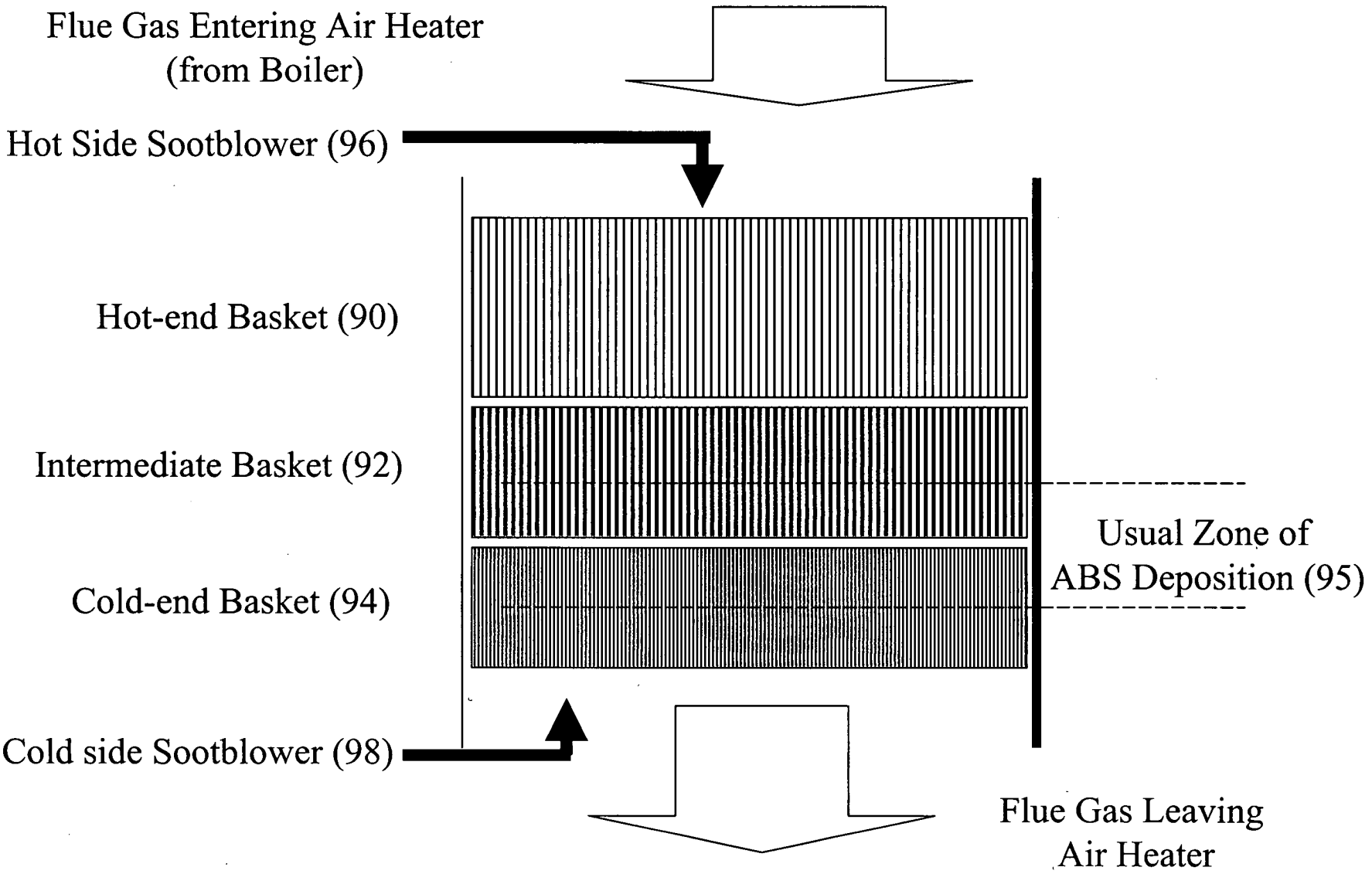

Figure 9: Two Stage SCR Process reactor

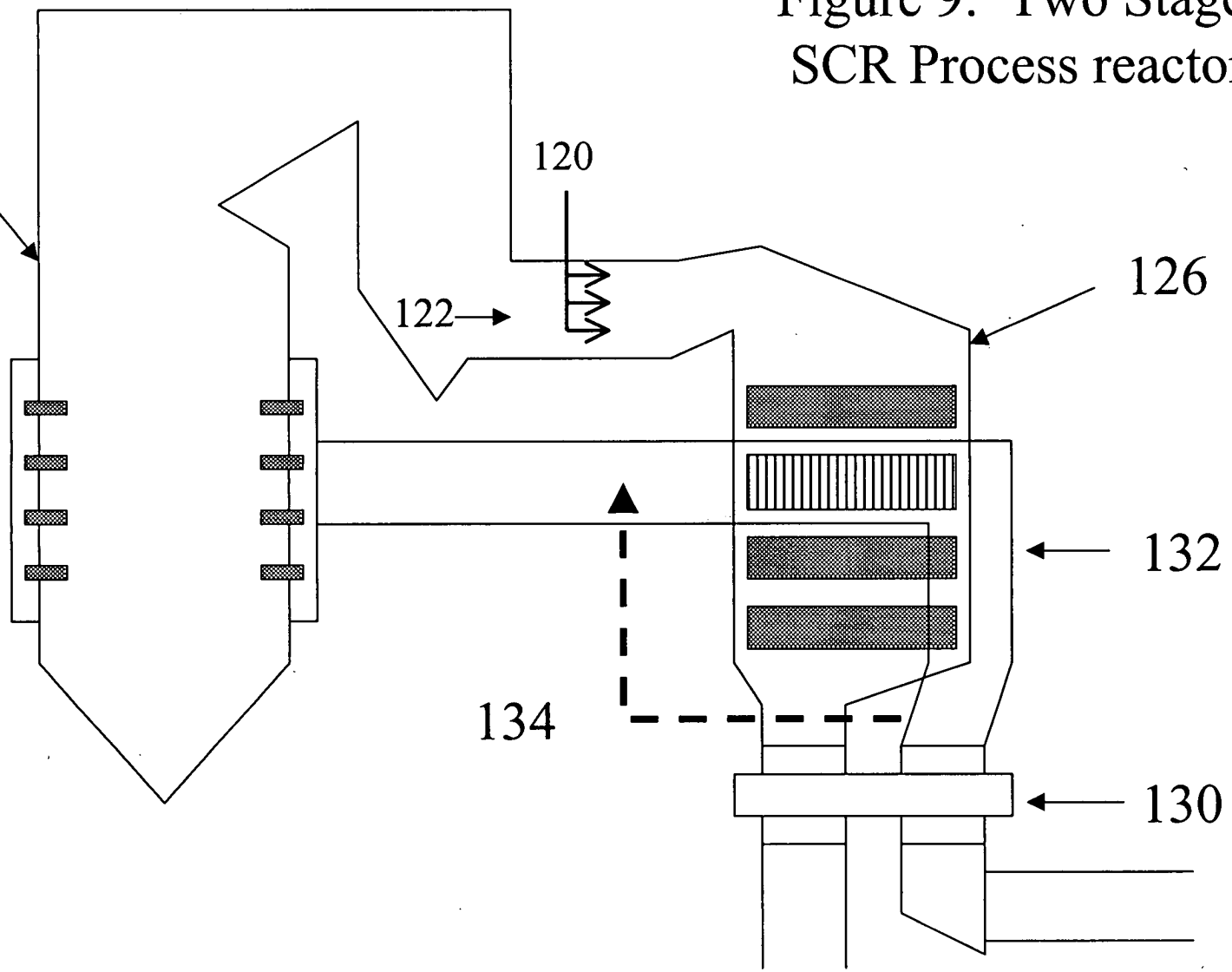

Figure 10: Flue Gas Flow Entering
and Exiting The Tube-Type Heat Exchanger

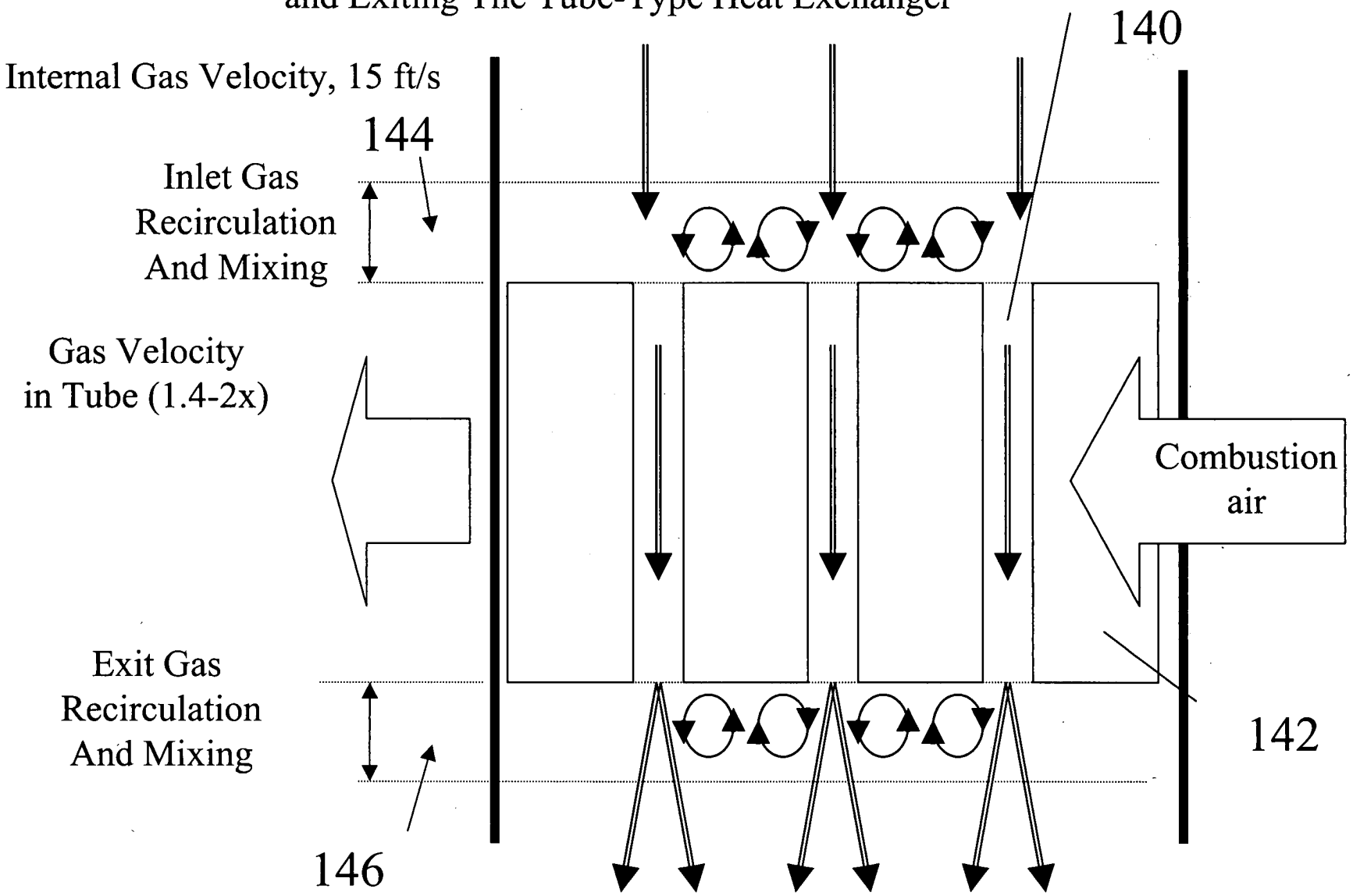

Figure 11: Improvement in NOx Removal Due To Reduction in Standard Deviation of NH3/NO After The First Catalyst Layer

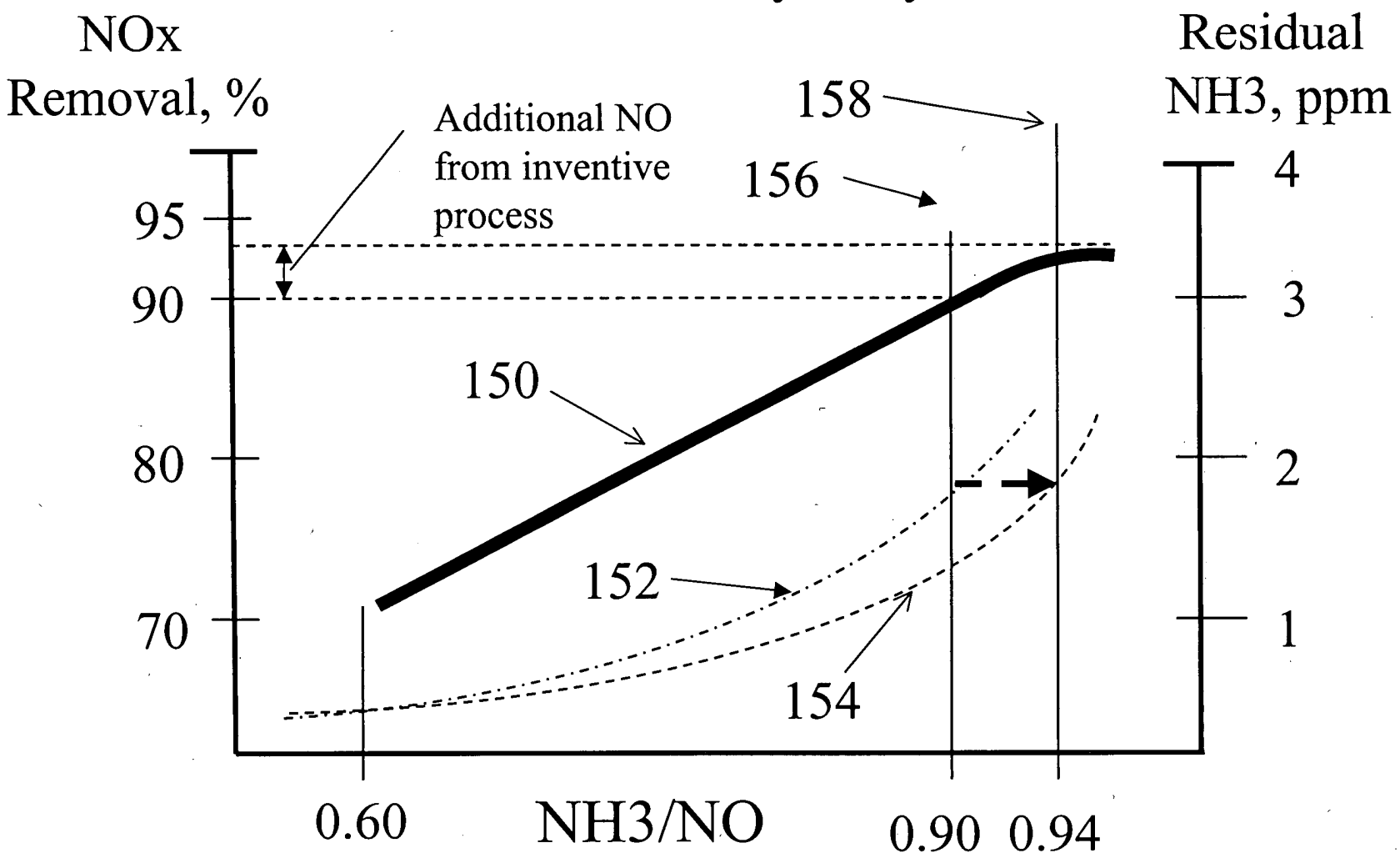

FIGURE 12: SCR PROCESS CONDITIONS ACROSS THE REACTOR AND EACH OF THREE CATALYST LAYERS

	NOx Removal (%)	Residual NH3 at Nox Reduction, ppm		Standard Deviation At Entrance to Reactor or Layer (%)		Flue SO3 (ppm)		ABS Onset Temp, F	
		Conventional Design	*Inventive Process*	*Conventional Design*	*Inventive Process*	*Conventional Design*	*Inventive Process*	*Conventional Design*	*Inventive Process*
Process Inlet		n/a	n/a	5%	5%	15	15	575	575
Layer 1									
Across	68%								
Exit		50	45	15%	10%	21	21	450	400
Layer 2									
Across	19%								
Exit		12	7	36%	20%	31	25	430	375
Layer 3									
Across	3%								
Exit		6	2	47%	28%	45	29	375	360

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Figure 13. Relative Oxidation of Hg and SO2